

### REMARKS

5 A corrected set of drawing sheets are being submitted. Claims 1-4, 8-10, 12, 19, 22, 25-27, 68, and 71 have been amended. Claims 76-88 have been cancelled without prejudice. Applicants reserve the right to pursue these claims in a divisional or continuing applications. Claims 1-20, 22-30, 63-64, 68, 71, and 74-75 remain in the application. Further examination and reconsideration of the application, as amended, is hereby requested.

10 On page 2 of the Office Action, the Examiner objected to the drawings because of poor quality. In response to this objection, Applicants are submitting herewith a set of substitute drawings. Approval of these drawing corrections is respectfully requested.

15 On page 3 of the Office Action, the Examiner objected to claims 2-20, 22-30, 63-64, 68, 71, and 74-75 due to informalities. In particular, the Examiner requested that the claims be corrected to American spelling. Applicants have corrected the claims accordingly. Withdrawal of this objection is respectfully requested.

#### **Claim Rejections**

20 Claims 1-20, 22-30, 63-64, 68, 71, and 74-75 stand rejected as anticipated under 35 USC 102(b) or obvious under 35 USC 103(a) over Yudasaka et al.

25 Claims 1-20, 22-30, 63-64, 68, 71, and 74-75 stand further rejected as anticipated under 35 USC 102(b) or obvious under 35 USC 103(a) over Furusawa et al.

Claims 1-20, 22-30, 63-64, 68, 71, and 74-75 stand further rejected as anticipated under 35 USC 102(b) or obvious under 35 USC 103(a) over Kamata et al.

30 As explained below, Applicants respectfully traverse these rejections after amendment and respectfully request reconsideration.

The standard for prima facie anticipation under 35 USC 102 is that "[t]here must be *no difference* between the claimed invention and the reference

disclosure, as viewed by a person of ordinary skill in the field of the invention." (Scripps Clinic & Research Found. v. Genentech, Inc., 18 USPQ2d 1001, 1010 (Fed. Cir. 1991)) That is, the prior art reference must disclose each element of the claimed invention "*arranged as in the claim*" in question. (Lindermann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 221 USPQ 481, 485 (Fed. Cir. 1984)). Applicants has amended the independent claims to better define and distinguish their invention over the art made of record.

The Supreme Court in the recent Supreme Court decision, KSR Int'l Co. v. Teleflex, Inc., 127 S. Ct. 1727 (2007) noted that the Examiner must provide "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness", such that the Examiner must "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does."

As noted above, the Supreme Court in KSR stated that the Examiner must provide "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness", such that the Examiner must "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." It stands to reason, therefore, that the Federal Circuit's precept in In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984), still is good law in this respect, that if proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. (Cited in MPEP, 2143.01.V)

Applicants also note that it is improper to cite references where the references teach away from their combination. (In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)) This principle was cited with approval in the recent Supreme Court decision, KSR. The Supreme Court in KSR discussed in some detail United States v. Adams, 383 U.S. 39 (1966), stating in part that in that case, "[t]he Court relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." Accordingly, it remains improper to combine references where the references teach away from their combination.

With respect to the first rejection, the Examiner argues that independent claims 1 and 22 are anticipated or obvious over EP 1,085,578 to Yudasaka. Applicants have amended claims 1 and 22 to more clearly define and distinguish their invention. In Yudasaka, the silicon and doped silicon films are prepared by first depositing the silicon containing material as a liquid precursor. This liquid precursor contains molecules of a silicon chemical compound of the form  $\text{Si}_a\text{X}_c$  where Si is silicon and X is hydrogen or a halogen (chlorine, bromine, fluorine etc) or  $\text{Si}_a\text{Y}_b\text{X}_c$  where Y is a dopant atom of boron or phosphorus, and a, b & c are integers of 3 or more. The silicon precursors are individual *molecules* which are *dissolved* in a solvent, therefore the material is a *pure liquid*. Once deposited on a substrate, the heat treatment step of Yudasaka first allows for the removal of the solvent and secondly results in the *decomposition* of these molecules. On decomposition the silicon atoms combine to form a solid silicon film. This process is used to produce a silicon thin film transistor.

This differs from the claims 1 and 22, as amended, in the present application which claim semi-conductor nanoparticles and dopant being deposited on a substrate. In accordance with these claims, the particles are not individual molecules but rather *very small solid clusters* of *solid pure semi-conductor* material. This material is not dissolved in the liquid but is rather *suspended* in it through the use of dispersing agents, see claims 11 to 13. The material is therefore deposited in the form of *a solid in liquid suspension rather than a pure liquid*.

As such, the heat treatment step in the present case, does not involve decomposition but rather a physical change of melting followed by recrystallisation. The Applicants process is inventive over Yudasaka as it allows for selective placement of the nanoparticles rather than a blanket deposition.

Thus, contrary to the assessment of the Examiner, it should be clear that both claims 1 and 22 are novel vis-a-vis Yudasaka in reciting that semi-conducting nanoparticles are deposited on a substrate and that these nanoparticles are subsequently fused.

Furthermore and again contrary to the assessment of the Examiner, it should also be clear that claims 11 to 13 are not disclosed by Yudasaka and in particular the passage from para [0069] to [0074] referred to by the Examiner. This passage is exclusively concerned with "a solution prepared by dissolving the silicon". Examples of a polyetheralkyl based surfactant are disclosed but in accordance with para [0070], the surfactant is added "within a range not compromising the objective functions" i.e. not effecting the solution. Instead the surfactant when added "makes wettability of the solution to the coating object good." As such while Yudasaka discloses a surfactant, it is not added to the extent that the otherwise homogeneous phase solution might change to a suspension - in fact Yudasaka points directly away from this possibility and thus teaches away.

Separately to the above-mentioned portions of Yudasaka relating to forming silicon based devices, Applicants acknowledge that in three distinct passages, para [0077], [0088] and [0097], Yudasaka discloses dispersing metal fine particles in a solvent into which a substrate can be dipped. However, this does not relate to dispersing semi-conducting material disclosed earlier nor does it provide an incentive to do so and so serves to further emphasise the distinctiveness of the present claims from Yudasaka.

As such, not only are claims 1, 11-13 and 22 novel vis-a-vis Yudasaka, but they are also inventive and thus they do not relate simply to an obvious variation of the various solutions of Yudasaka as argued by the Examiner, and therefore a distinct and inventive departure from the teaching of Yudasaka.

With regard to the second rejection also referred to by the Examiner, US 6,518,087 to Furusawa discloses the same processes as Yudasaka to produce silicon and doped silicon films to produce a solar battery. This is not surprising as both applications have a common assignee. As such, the distinctions from the present claims are as above to Yudasaka.

With regard to the third rejection also referred to by the Examiner, US 6,086,945 to Kamate discloses the use of fine solid particles of silicon as precursors for the formation of polycrystalline silicon thin films. In this instance the silicon particles are first sprayed into a plasma inside a silicon metal deposition

apparatus which they are *converted to liquid form*. *The silicon material is deposited on the heat resistant substrate in this liquid form*, on deposition the liquid silicon solidifies and the film is thus built up. The particle size is in the micron range, see col 8 lines 22-24 and for this reason alone, it should be clear that Kamate is not relevant to the present case. Kamate requires that the deposition is carried on *substrates which can withstand the high temperatures* of molten silicon. Once deposited the silicon film is reheated to allow for recrystallisation.

Kamate differs from the present case in so far as the silicon is rendered molten prior to the deposition as opposed to *depositing in solid nanoparticle form and fusing in situ on the substrate*. The approach of the present case thus allows material to be deposited in a pattern as opposed to the blanket film of Kamate and is thus inventive over Kamate. The key difference is that the combination of nanoparticles ( which allow for melting point suppression) and fusing, for example, by laser heating (short pulse heating which does not penetrate to the substrate) of the present case affords the use of substrates which cannot withstand high temperatures such as polymers or glass.

Applicants therefore trust that it should be clear that the claims are novel and inventive vis-a-vis Kamate.

The remaining dependent claims are believed patentable based at least on the patentability of their respective parent claims, as amended.

Therefore, one trusts that in the light of the above comments and the enclosed amendments, the Examiner on re-consideration will find the application in order for allowance. Accordingly, withdrawal of the various rejections under 35 USC 102(b) and 35 USC 103(a) is respectfully requested.

The prior art made of record but not relied upon by the Examiner has been reviewed, but is no more pertinent to Applicants' invention than the cited references for the reasons given above.

Applicants believe their claims as amended are patentable over the art of record, and that the amendments made herein are within the scope of a search properly conducted under the provisions of MPEP 904.02. Accordingly, claims 1-20, 22-30, 63-64, 68, 71, and 74-75 are deemed to be in condition for allowance, and such allowance is respectfully requested.


If for any reason the Examiner finds the Application other than in a condition for allowance, the Examiner is respectfully requested to call Applicants' undersigned representative at the number listed below to discuss the steps necessary for placing the application in condition for allowance.

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 08-2025. Should such fees be associated with an extension of time, Applicants respectfully request that this paper be considered a petition therefore.

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